RISK FACTORS FOR PREDICTING RECIDIVISM IN YOUTH : DO WE NEED SEPARATE MODELS FOR MALES AND FEMALES?

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Abstract

Do the same risk factors predict recidivism in both male and female youth? The current research obtained historical data about a sample of 936 young people who received a Youth Justice (YJ) Intake to Child, Youth and Family (CYF) during 2002. Statistical analyses were performed to develop separate models to predict recidivism in males and females. The risk factors that predicted recidivism for males and females were significantly different. These models were then tested against the opposite gender's data to see whether there was a significant reduction in predictive validity. Only when the female model was applied to the male data was there a significant reduction in predictive validity.

Introduction

One of modern society's biggest worries is crime, and what seems to be the inexorable increase of criminal behaviour. Crime is not only becoming more and more violent, but more women, children and white-collar individuals are engaging in this sort of behaviour.

Many researchers in psychological fields have been contributing to research to provide explanations for the contributing factors towards criminal behaviour. Some of these explanations include dysfunctional family functioning and early adjustment problems (Fergusson & Horwood, 2002), socio-economic status and anti-social peer groups (Loeber & Farrington, 1998), personality traits (Caspi, Moffitt, Silva, Stouthamer-Loeber, Krueger and Schmutte, 1994) and impulsivity (Henry, Caspi, Moffitt & Silva, 1996).

According to research world-wide, around 25% of all crimes serious enough to be reported to police are committed by young people (Grace & McLean, 2003). But what causes young people to commit crime?

Much research has been done in America to find the risk factors and protective factors when it comes to youth crime, but can this research be generalised to New Zealand's youth population?

In this research it was decided to look at historical data for youth offenders in New Zealand and from this data create a risk prediction model for recidivism. In addition to this, it was decided to compare the risk prediction models for males and females to discover whether there were separate risk factors for each sex.

The following literature review begins by looking at three of the major theories of why people commit crime. It then looks at Moffit's (1993) research on the difference

between life-course persistent offenders and adolescent-limited offenders. The writer then looks at some of the major theories of the development of delinquency, and follows through into how we can identify life-course persistent offenders. It then finishes off by looking at Youth Crime in New Zealand and the current research topic.

General Theories of Crime

Genetics and Crime

One of the most popular inferential theories of crime is that it is genetic. There are many examples of criminal behaviour "running in families". But is there any scientific proof for this theory?

Results from twin studies point to genetics playing a role in criminal behaviour. An analytical summary of twin studies by Carey and Goldman (1997) found that six of the seven "modern" (post-1968) studies showed a significant genetic effect. However, the major methodological flaw with these studies is that they all used twins raised together. This means that their environmental influence would also be almost identical.

To try and combat this problem Mednick, Gabrielli and Hutchings (1984) completed a study working with a databank that includes social history information on more than 14,000 children who were adopted in Denmark between 1924 and 1947. Mednick et al. looked at the convictions of the adoptees in relation to the criminal convictions of both their biological and adoptive parents. The results (Table 1.1) show that adoptees raised by noncriminal adoptive parents, but who had criminal biological parents were

at a higher risk of being convicted. This evidence is consistent with the genetic effect predicted by inferential theory.

Criminal Adoptive Parents?	**Criminal Biological Parents?**	
	Yes	**No**
Yes	24.5% (of 143)	14.7% (of 204)
No	20.0% (of 1226)	13.5% (of 2492)

Table 1.1 : Percentage of children with convictions of criminal biological and adoptive parents (Mednick et al., 1984).

Social Learning Theory

Bandura's (1973) Social Learning Theory of aggression assumes that aggressive behaviour is *acquired* from watching and listening to other's behaviour, especially so if that person is a role model for the individual. In terms of criminal behaviour, this means that if a young person sees a person they admire steal something, they are likely to try it too. Inferentially, this explains why there are often "criminal families" – the children watch their parents commit crime, and, in wanting to be like them, commit crime too.

This was shown in Walters & Grusec (1977) when their study showed that observing aggression leads to hostility in both children and adults. This explains the domestic violence cycle, where often children that were abused will then go on to abuse their children.

Personality and Crime

According to Eynsenck (1996) predisposition towards crime is genetic, and lies in an individual's personality. There are 2 major scales of personality that Eynsenck believes contribute to a person's predisposition towards crime : extraversion and neuroticism.

Extraversion is the degree to which a person is more likely to engage in sensation seeking behaviour. The higher someone is on the extraversion scale, the more likely it is they will engage in risk-taking behaviour – often putting them at odds with the law. Eynsenck believed this is to do with levels of cortical arousal. Extraverts (those high on the extraversion scale) have low levels of baseline cortical arousal. This means they will often seek stimulation to heighten these levels. Introverts (those low on the extraversion scale) however, already have high levels of cortical arousal and therefore do not need to seek stimulation.

As a point of interest, alcohol has another effect on this behaviour. As alcohol is a depressant, it lowers the levels of cortical arousal further. This means that introverts, when drinking, will increase their risk-taking behaviour to return their cortical arousal to normal. This also means that extroverts don't need much alcohol at all!

The other scale that Eynsenck believed was crucial to the personality-crime link is Neuroticism. Neuroticism is the degree to how strongly and how long a person will emotionally react to stress. Those high on the scale (neurotics) are believed to have a hyper-sensitive limbic system, and so they have a faster and longer physiological reaction to emotional events. Under high emotionality a person is more vulnerable to their habits (be they good or bad). Therefore, if an individual (through Social Learning Theory) has learnt to react to stress through violence, a highly neurotic individual is more likely to do so.

Life-Course Persistent vs. Adolescent-Limited Offenders

One of the most important questions in crime research is not why people commit crime, but why some people *continue* to lead serious, chronic offending lifestyles. In other words, what makes someone re-offend?

Research tells us that a large percentage (50-60%) of offending committed by youths, is actually only committed by 4-6% of the cohort (Moffitt, 1993). This 4-6% of offenders were termed by Moffitt 'life-course persistent' offenders. The other 94-96% of offenders are termed 'adolescent-limited' offenders.

Adolescent-limited offenders' antisocial behaviour appears at the beginning of adolescence and rapidly escalates. Moffitt theorised that this was caused by the gap between physical maturity and social maturity. These adolescents feel like are physically adult but do not yet have the social recognition of adult status. This causes psychological frustration and impatience in some individuals. These individuals tend to commit crimes that symbolise adult privilege and demonstrate autonomy, e.g. status offences, vandalism, theft and drugs taking. These crimes are profitable and rewarding, but are easily abandoned when pro-social behaviour becomes more rewarding.

Life-course persistent offenders, however, tend to begin their antisocial behaviour much earlier in their childhood. Moffitt traced delinquency in this group through research from maternal drug use and nutrition, to difficult temperament, poor parenting and learning difficulties, and onto antisocial behaviour. Moffitt emphasises, however, that these individuals are not "born criminals", but that progressive exposure to a multitude of risk factors has a cumulative effect on the child's ability to cope in a pro-social manner. As a result of these cumulative effects, the individual's cognitive

and social development is impaired, and schooling and social interaction are negatively affected. This means their opportunities for the future are significantly reduced, and instead they turn to antisocial behaviour and criminal activity.

Since it has been evidenced that chronic, serious adult offenders usually begin their criminal careers in adolescence, it is imperative that we work towards identifying these at-risk youth to put effective interventions into place early. It was mentioned earlier that it is not one risk factor that causes delinquency, but the cumulative effect of many. So what are these risk factors?

Theories of Delinquency

There has been much research into trying to find a model that will accurately predict development of life-course persistent offending. There are 3 main theories that stick out in the literature – developmental pathways, risk factors and protective factors.

Developmental Pathways

Loeber, Wung, Keenan, Giroux, Stouthamer-Loeber, Van Kammer and Maughan (1993) proposed a theory about the development of criminal or delinquent behaviour. They stated that there were three developmental "pathways" to delinquency.

The first pathway is the 'overt' pathway. Children on this pathway begin with bullying in their younger years, which leads onto fighting, then developing into adolescent violence.

The second pathway is the 'covert' pathway, characterised by the child lying and stealing. This leads into more serious property crimes in adolescence.

The third pathway is the 'authority conflict' pathway. Children on this pathway display such behaviour as truancy and running away from home.

With all of these pathways, the behaviour is firstly directed towards the parents and siblings, and as they age, towards peers and strangers.

Risk Factors

One of the most popular theories has to do with the build-up of risk factors as discussed in the previous section of this review. Loeber and Farrington (2000) came up with a list of risk factors for the development of delinquency. These came under 5 areas : child, family, school, peers and neighbourhood.

There have been many attempts to develop a screening tool for children similar to adult screening tools, to identify those at a high risk of re-offending before they become chronic offenders. The Intake Assessment Worksheet from the 8% Early Intervention Programme is one such screening tool (Kurz and Moore, 1994; Schumacher and Kurz, 1999). They found that three of the five risk areas above (family problems, school problems and individual problems) as well as a fourth (pre-delinquent behaviour – including truancy and gang associations) were significant predictors of recidivism in their population. The developers of the measure found that it correctly predicted chronic, serious offending in 70% of the children.

Protective Factors

A third and interesting theory does not look at those who re-offend, but those who present with the same risk factors and do *not* re-offend. In these cases, researchers look at 'protective factors' – those factors that seem to 'protect' a child from

developing serious delinquency. It seems that for every risk area, there tends to be some protective factor.

Parenting practices – Often, poor parenting practices can compound the effects of already present risk factors. Patterson (1982) developed a theory called 'coercion theory'. This theory is based on the premise that oppositional behaviour from a child is responded to by the parent enforcing boundaries. The cycle will continue until either the child or the parent backs down. Gardner (1989) researched this theory and found that mothers of children with conduct problems were more likely to back down first than mothers of 'normal' children. Ten years later, Gardner, Sonuga-Barke and Sayal (1999) furthered this research by watching the interactions of mothers giving instructions to their 3-year-old children with conduct problems. They found that children of mothers that used positive, pre-emptive strategies were less likely to have conduct problems at age 5. This research suggests that positive parenting practices could be a protective factor for at-risk children.

Peer Relationships – There are 2 sides to the coin when it comes to protective factors in peer relationships. Tremblay and LeMarquand (2001) studied a group of boys from kindergarten through to adolescence. Teacher ratings of pro-social behaviour at kindergarten were negatively correlated with violent crimes in adolescence. This suggests that having positive social skills could be a protective factor against delinquency.

On the other side of the coin, some researchers have found that shyness could be a protective factor. Farrington, Gallagher, Morley, St. Ledger and West (1988) studied a group of London boys who had been identified as 'at-risk' due to having many of the

risk factors described earlier. Only 25% of this sample remained conviction-free by age 32. On investigation, the researchers found that those with fewer friends at age 8, were more likely to remain conviction-free.

Resilience – More and more research is being done into these protective factors, and research has termed the relative presence of these factors 'resilience'. Although there is little validated research into this area as yet, it will be an area to watch with interest.

Identifying Life-Course Persistent Offenders – What Are The Risk Factors?

Disruptive Behavioural Disorders

Persistent, serious offending is often preceded by disruptive behaviour earlier in the individual's childhood. Moffitt (1993) stated that early conduct problems in children is a clearly evidenced risk factor for prediction of life-course persistent offending. Often, these children will come to the attention of mental health services early on with what they term 'Disruptive Behaviour Disorders' or 'DBD's.

The 3 main diagnoses that are of import here are Conduct Disorder (CD), Oppositional Defiant Disorder (ODD) and Attention Deficit-Hyperactivity Disorder (ADHD).

None of these DBDs are situation specific, and to receive a diagnosis, an individual must display the behavioural 'symptoms' consistently enough for it to be considered an impairment to 'normal' functioning.

Conduct disorder is characterised by persistent violations of social norms and rights of others (Hill, 2002). Many of the criterion for CD are actually criminal or 'status' offences; for example, truancy, running away from home, fire-setting, vandalism, thieving and aggression towards other people. The disorder is also associated with other known risk factors for delinquency, including "learning disabilities and substance-related disorders" (Grace & McLean, 2003, pg 9).

Oppositional Defiant Disorder is similar to Conduct Disorder, however, is less aggressive. It is characterised by defiant and disobedient behaviour, and is usually noticeable by age 8. Its development is progressive, stemming from early disruptive behaviour into ODD, and for a "significant proportion" of individuals (according to the DSM IV) ODD continues to progress into CD.

Attention Deficit-Hyperactivity Disorder has two sets of criteria : Inattentiveness and Hyperactivity-Impulsivity. Inattentiveness is characterised by difficulty in organising oneself, forgetfulness and an ability to be easily distracted. Hyperactivity-Impulsivity is characterised by restless behaviour, talkativeness and interruptive and intrusive behaviour. ADHD has a high rate of co-morbidity with CD and ODD and confounds the behavioural issues stemming from these disorders.

Many studies dating back from the 1950s have shown that late teenage and early adult offenders have lives characterised by the same sort of symptoms (defiance, aggression, restlessness and impulsivity) as are implicated in these early childhood DBDs. This suggests that early, effective interventions at the time of diagnosis of these DBDs could prevent later serious, persistent offending. Of course, not all children diagnosed with DBDs become life-course persistent offenders, and in fact

Lynam (1996) showed that fewer than 50% of children diagnosed with CD/ODD had antisocial adulthoods. As mentioned before, there are other risk factors alongside DBDs that contribute to chronic antisocial behaviour.

Family/Parenting Problems

Parents play a crucial role in the early socialisation of children. Interaction with parents teaches children rules, social interaction skills and behavioural norms. Patterson (1982) has completed extensive research into parenting practices with children who have antisocial behaviour problems. He identified several ways in which parent's practices could be maladaptive, including ambiguous feedback, poor supervision and lack of encouragement and reinforcement of pro-social behaviour and responsibility.

Ehrensaft, Wasserman, Verdelli, Greenwald, Miller and Davies (2003) found that worsening of young boys' antisocial behaviour was related to lower parental involvement and monitoring. This research suggests that interventions aimed at improving parenting skills may reduce the risk of antisocial behaviour continuing into adolescence.

Social Problems

If DBDs such as Conduct Disorder and Attention Deficit-Hyperactivity Disorder are not addressed early, they can have an impact on social interaction with peers in school age children.

As per the saying "birds of a feather, flock together", children with conduct problems tend to be rejected by non-deviant peers and end up associating with other

children that also have conduct problems (Coie & Dodge, 1997). This seems to be due to their presentation of inappropriate aggression, such as bullying.

There is much evidence that peer rejection predicts delinquency and further antisocial behaviour (Coie & Dodge, 1997) and that association with deviant peers reinforces antisocial behaviour (Dishion, McCord & Poulin, 1999).

This research suggests that interventions aimed at reinforcing positive peer associations may reduce the risk of mild delinquency developing into criminal activities during adolescence.

Male vs Female Predictors of Delinquency

Male prediction models for delinquency and criminal behaviour have been long applied to females as well. Part of the reason for this may be that females still represent a small proportion of the criminal population (Funk, 1999). Another reason may be that it has been assumed that the risk factors that predict male delinquency, also predict female delinquency.

Funk (1999) decided to investigate the differences between the predictors of delinquency in males and females. He compared the predictive validity of a male-only model, a female-only model, and a combined model. The combined model and male-only model were very similar with five of the same risk factors (financial hardship, poor school behaviour, age at focus offence, placement in detention, and frequency of weighted prior offences). The only difference between the combined model and male-only model was that the male-only had poor peer groups as its sixth predictor and the combined had special education as its sixth predictor.

The female-only model was very different, however. The only overlapping predictor with the combined model was placement in detention. It also had 3 unique factors : child abuse, runaway, and frequency of prior person offences. There was also a significant drop in the predictive validity for females when changed from female-only model (31%) to the combined model (17%).

Salekin, Rogers, Ustad & Sewell (1998) found that substance abuse is more highly correlated with female delinquency than male delinquency, and also that they score higher on psychopathy checklists.

d that females are more likely to suffer from internalising problems such as depression and anxiety. Chandy (1996) found that depression and anxiety in females are especially pronounced when they have been exposed to traumatic events, which is concerning given the high incidence of abuse in the histories of female delinquents (Acoca, 1998).

Youth Crime in New Zealand

There is little research on the amount of youth crime in New Zealand, which makes it difficult for researchers and developers to build up an overall picture of the scale of interventions and research that needs to be done. There is, however, some research done on those serious child offenders who are referred for Family Group Conferences (FGCs) by the police. A family group conference is a formal meeting that can have two purposes: a) a family group meeting with social workers to decide what needs to be done to make sure a child is safe and well cared for (in a Care and Protection case)

or b) for members of a family group, the young offender and the victim decide how the young offender can be held accountable for their behaviour.

Maxwell and Robertson's (1995) report showed that these children showed the same pattern of risk factors show by overseas studies (unstable families, school problems, substance abuse problems and truancy). Of the young people that Maxwell and Robertson's study encapsulated, 79% had re-offended in the 18-month period following the FGC.

This result suggests that FGCs are not providing suitable interventions. The review showed that of the referrals only 78% of the FGCs actually occurred, and of those that occurred only 28% completed the intervention plans set out in them.

This research combined with the high recidivism rate suggests that interventions into youth crime are not currently effective.

Current Research

In light of the bleak outlook on interventions in New Zealand youth crime, the current research aims to look into identifying those at risk of recidivism, before we can put effective interventions into place.

It was decided to analyse historical data gathered from Child, Youth and Family's (CYF) CYRAS database, and the New Zealand Police's NIA database, to develop a predictive model for those at risk of re-offending. Of interest was to see if there was a difference in the risk factors for males and females, and whether a there was a significant difference in the predictive validity of these models for each sex.

METHOD

Data Collection

Data for this thesis were sourced from a database of young offenders produced during the evaluation of the Reducing Youth Offending Programme (RYOP; Grace, McLean, & Warren, 2006). A brief description of the full data set is provided first.

Grace et al. (2006) identified all young persons in New Zealand who received a Youth Justice (YJ) Intake to Child, Youth and Family (CYF) during 2002 through searching the CYRAS database. A total of N = 4,307 young persons were identified. Raw data for this sample were then downloaded automatically that represented each young person's entire CYF history. The date of the first YJ intake in 2002 was defined as the criterion date. The follow-up period began after the criterion date and continued until 31 December 2004.

Information from CYRAS fell roughly into two categories: Care and Protection, and Youth Justice. All referrals to Child, Youth and Family are divided into these two categories. The former represents children or young people who are believed to be 'at risk' of physical, emotional or sexual abuse, or are suffering from neglect or inadequate care, whereas Youth Justice is a "special section of the law which deals with offending by children aged 10–13 years, and young people aged 14–16 years." (Child, Youth and Family, 2008).

Specific variables from CYRAS related to intakes, family group conferences (FGCs), social worker findings, court appearances, placements, as well as demographic variables such as date of birth, gender and ethnicity. Social worker findings are the results of an investigation when an allegation is made about neglect, ill-treatment, harm or abuse of a child. In addition to these variables, the geographical region was

also noted. CYF divides NZ into six administrative regions: Northern, Auckland, East-West, Midlands, Wellington – Upper South, and Southern.

A random sample of N = 1000 cases was then obtained. To ensure that this sample would be representative in geographical terms, sampling was stratified by geographical region such that the percentage of cases in each region was as follows: Northern, 15%; Auckland, 18%; East-West, 14%, Midlands, 21%, Wellington – Upper South, 12%, and Southern, 20%. These percentages corresponded to those in the full sample.

For each case in the sample (N = 1000), full records from the NIA (National Intelligence Application) database were downloaded manually. NIA is the primary database used by the NZ Police and contains two sources of information relevant to youth offending: a) prosecutions for criminal charges (not including minor traffic offences), which includes the specific court hearing date, disposition, offence date, offence details, offence code (i.e., the four-digit code used by NZ Police), and outcome; and b) 'intelligence notings' and 'occurrences'. As an example of an intelligence noting, if a police officer obtained information from a suspect that young person X was involved in gang-related activity, that would appear as an intelligence noting in X's file. An occurrence was typically an interaction with a Police officer for which criminal activity might have been suspected but did not eventuate in formal charges. For example, if a police officer observed suspicious activity involving young person X and intervened to give a verbal warning, this would appear as an occurrence in X's file. Thus, the number of intelligence noting and occurrences provides a measure of frequency of contact with police. Other variables sourced from NIA included criminal prosecutions that occurred both prior to and after the criterion date.

To obtain the final sample for the present study, we selected only those cases that were aged between 13 and 17 years at the criterion date. The final sample comprised 936 young persons (745 male, 191 female).

Demographic and Predictor Variables

The variables obtained by Grace et al. (2006) from the CYRAS and NIA data are summarized in Table 2.1 below.

Variable	**Code**
Gender (Male/Female)	[MF: 1 = Male; 0 = Female]
Ethnicity (Pakeha/Maori/Pacific/Other)	[MP; 1 = Maori/Pacific; 0 = Not Maori/Pacific]
Age at First CYF Intake	[Age1stIntake]
Age at Criterion	[AgeatCriterion]
Rate of CYF Intakes (number of intakes per day divided by difference between criterion and first intake dates)	[RateofCYFIntakes]
Age at First YJ Intake	[AgeatFirstYJIntake]
Number of Prior Care & Protection (C&P) intakes	[NumPriorC&P]
Number of Prior YJ intakes (both C&P and YJ)	[NumPriorYJ]
Number of Prior Intakes	[NumPriorIntakes]
Number of Prior Intakes – Section 15	[NumPriorIntakesSec15]
Number of Prior Intakes – Urgent	[NumPriorIntakesUrgent]

Number of Prior Placements (in foster homes or other residential facilities)	[NumPlacements]
Number of Prior Findings	[NumPriorFindings]
Number of Prior Findings – Behavioural/Relationship Difficulties	[NumPriorFindingsBRDifficulty]
Number of Prior Findings – Emotional Abuse	[NumPriorFindingsEmotAbuse]
Number of Prior Findings – Neglected by	[NumPriorFindingsNeglected]
Number of Prior Findings – Not Found	[NumPriorFindingsNotFound]
Number of Prior Findings – Physical Abuse	[NumPriorFindingsPhysAbuse]
Number of Prior Findings – Self-Harm/Suicidal	[NumPriorFindingsSelfHarm]
Number of Prior Findings – Sexual Abuse	[NumPriorFindingsSexualAbuse]
Number of Prior YJ-FGCs	[NumPriorYJ-FGCs]
Number of Prior YJ-FGCs – No agreement	[NumPriorYJ-FGCNoAgree]
Number of Prior Court Outcomes	[NumPriorCourtOutcomes]
Number of Prior Court Outcomes – Supervision	[NumPSupervisionOutcomes]
Number of Prior Court Dates	[NumPriorCourtDates]
Number of Prior Court Outcomes – Custody	[NumPCustodyOutcomes]

Number of Prior Court Outcomes – Custody or Supervision	[NumCustSuperOutcomes]
Number of Prior Court Outcomes – Other YJ	[NumPOtherYJOutcomes]
Number of Prior YJ-FGCs – Custody or Supervision	[NumFGCCustSuper]
Number of Prior Youth Aid referrals	[NumPriorYouthAid]

Table 2.1: Demographic and predictor variables used, and their codings.

The variables were recoded to give values to the different numbers of events in the youths' histories to account for outliers or extreme values. These values are listed in Appendix 1.

Re-offending

A measure of recidivism was defined as a prosecution for a new criminal offence, or a new youth justice intake, that occurred after the criterion date and prior to the end of the follow-up period (31 December 2004). Thus, the follow-up period was at least 2 years for the entire sample. The offence date was recorded so that time-based analyses (e.g., survival analysis; Cox regression) could be conducted.

Data Analysis

Our plan was to examine correlations between historical and demographic variables that were potentially predictive of re-offending separately for males and females. The first question was whether the variables that were significantly related to re-offending were different for males and females. Next, we conducted regression analyses to

develop predictive models for re-offending for each gender. We then completed more regression analyses to test whether there was a significant drop in predictive validity when the opposite gender's model was used.

RESULTS

Firstly, descriptive statistics of all the factors measured were sought. This was to gain an overall picture of the difference in significant variables for male and female offenders.

The means and standard deviations were calculated for males and females for each factor, and t-tests were performed to measure the difference between males and females on each factor. The results are displayed in Table 3.1.

Variable	Male		Female		T-test
	Mean	S.D	Mean	S.D	
MaoriPacific	0.46	0.50	0.54	0.50	1.88
AgeFirstIntake	12.77	3.84	12.04	4.16	-2.30*
AgeCriterion	15.66	0.90	15.57	0.89	-1.25
AgeAtFirstYJ	15.24	1.56	15.28	1.08	0.47
NumPriorCP	1.19	1.48	1.58	1.56	3.24**
NumPriorYJ	0.60	1.14	0.45	0.98	-1.73
NumPriorIntakes	2.04	2.39	2.36	2.43	1.67
NumPriorIntakeSec15	0.68	1.16	0.97	1.41	3.02**
NumPriorIntakeUrgent	0.65	1.20	1	1.46	3.40***
NumPriorIntake>Age10	1.81	2.63	1.96	2.33	0.73
NumPriorPlacements	0.74	1.39	0.91	1.42	1.44
NumFindings	0.92	1.36	1.27	1.44	3.16**
NumFindingsBRDifficulty	0.39	0.77	0.50	0.77	1.78

NumFindingsEmotAbuse	0.15	0.47	0.17	0.46	0.41
NumFindingsNeglected	0.16	0.55	0.26	0.65	2.07*
NumFindingsNotFound	0.21	0.54	0.33	0.71	2.55*
NumFindingsPhysicalAbuse	0.15	0.47	0.17	0.46	0.41
NumFindingsSelfHarm	0.01	0.10	0.03	0.20	1.96*
NumFindingsSexualAbuse	0.10	0.39	0.13	0.35	0.80
NumPriorYJ-FGC	0.54	1.16	0.36	0.95	-1.92
NumPriorYJ-FGC-NoAgree	0.03	0.18	0.04	0.28	0.67
NumPriorCourtOutcomes	0.41	1.13	0.36	1.00	-0.60
NumPSupervisionOutcomes	0.07	0.38	0.06	0.27	-0.37
NumPCourtDates	0.35	0.95	0.30	0.88	-0.70
NumPCustodyOutcomes	0.17	0.51	0.12	0.49	-1.08
NumCustSuperOutcomes	0.23	0.75	0.18	0.61	-0.95
NumPOtherYJOutcomes	0.07	0.41	0.09	0.47	0.67
NumFGCCustSuper	0.77	1.67	0.54	1.38	-1.76
NumPriorIntelligence	1.84	1.75	1.28	1.44	-4.06***
NumPriorOccurrence	2.59	2.08	2.17	1.92	-2.50*
NumPriorYouthAid	1.48	2.64	1.08	2.16	-1.94

Table 3.1 : Means and standard deviations of males and females on risk factors.

*** = p < 0.05, ** = p < 0.01, *** = p < 0.001**

Females from this sample were significantly younger at their first intake than males, however, male and females were of a similar age at their first Youth Justice intake. Females also had a significantly high number of care and protection intakes, as well as urgent intakes.

Females had significantly higher social worker findings, including higher rates of self-harm, neglect and also "not found".

Males and females did not differ significantly in the number of FGC and court outcomes.

Males had significantly higher numbers of Police occurrences and intelligence.

The next step was to look at the rates of re-offending. A reconviction within the follow-up period was coded as 1 and no further reconvictions were coded as 0. Table 3.2 shows the number of males and females that re-offended and did not re-offend.

	Re-offended	**Did not re-offend**
Male	447	298
Female	88	103

Table 3.2 : Number of males and females who re-offended and did not re-offended.

Males were shown to re-offend significantly more often than females: $\chi^2 = 12.04$, $p < 0.001$, $df = 1$.

Figure 3.1 shows the survival functions separately for males and females, obtained using the Kaplan-Meier method. The survivor function is the percentage of participants that had not re-offended over the follow-up period. Overall, the rate of re-offending was greater for males than females, as evidenced by the lower survivor function. The difference in rates of re-offending between males and females was significant, Gehan's Wilcoxon = -3.31, $p < .001$.

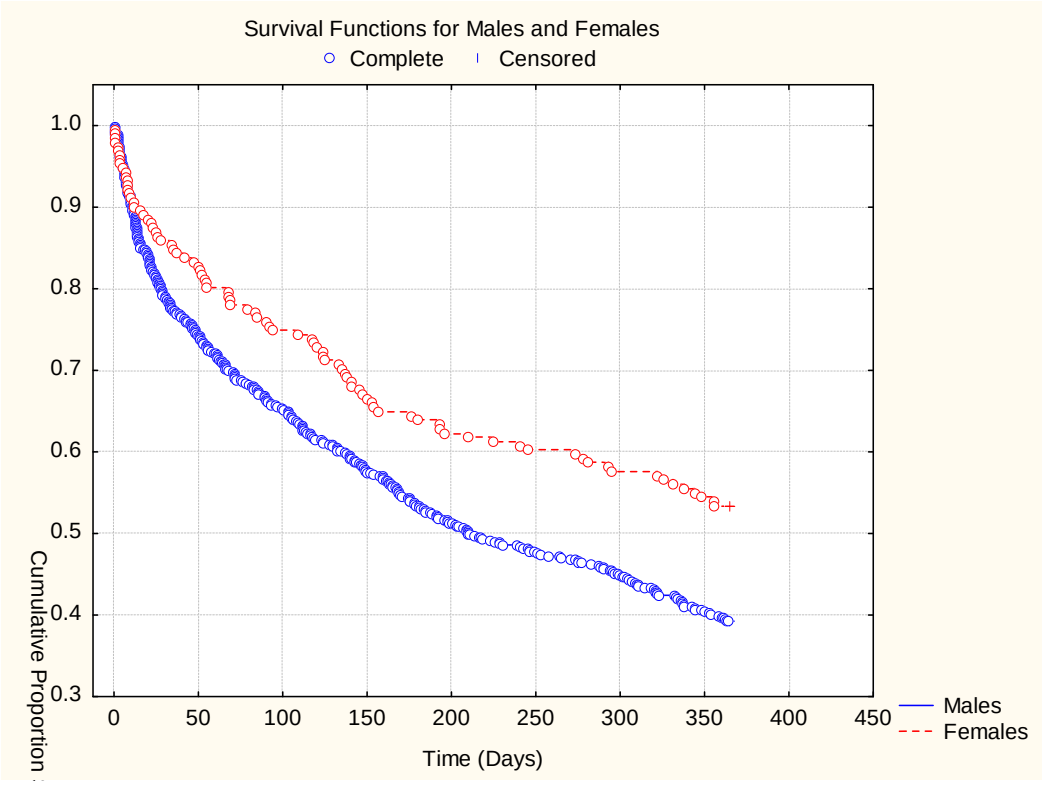

Figure 3.1 : Survival rates of males and females who had not re-offended over the follow-up period.

Next we examined the relationship between the variables obtained from CYRAS and NIA that represented the young person's history of contact with CYF and the Police and recidivism using a correlational analysis. Variables that are potential risk factors should be significantly correlated with recidivism. For each variable we also compared the difference between correlations for males and females using a *Z* test. The results are displayed in Table 3.3.

Variable	Correlation with re-offending		Diff Z-Score
	Males	Females	
MaoriPacific	0.12**	0.04	0.92
AgeAtFirstIntake	-0.18***	-0.16*	-0.17
AgeAtCriterion	0.01	0.07	-0.66
AgeAtFirstYJ	-0.14***	-0.06	-0.91
NumPriorCP	0.19***	0.25***	-0.73
NumPriorYJ	0.19***	0.21**	-0.19
NumPriorIntakes	0.25***	0.31***	-0.87
NumPriorIntakesSec15	0.13***	0.20**	-1.00
NumPriorIntakesUrgent	0.13***	0.18**	-0.60
NumPriorIntakes>Age10	0.23***	0.27***	-0.55
NumPriorPlacements	0.12***	0.22**	-0.47
NumFindings	0.15***	0.25***	-1.19
NumFindingsBRDifficulty	0.17***	0.18*	-0.12
NumFindingsEmotAbuse	0.03	0.09	-0.66
NumFindingsNeglected	0.08*	0.12	-0.50
NumFindingsNotFound	0.12**	0.19**	-0.87
NumFindingsPhysicalAbuse	0.05	0.07	-0.27
NumFindingsSelfHarm	0.06	0.01	0.57
NumFindingsSexualAbuse	0.01	0.09	-0.93
NumPriorYJ-FGC	0.17***	0.12	0.68
NumPriorYJFGCNoAgree	0.02	-0.01	0.39
NumPriorCourtOutcomes	0.20***	0.12	0.98

NumPSupervisonOutcomes	0.12***	0.03	1.12
NumPCourtDates	0.20***	0.13	0.99
NumPCustodyOutcomes	0.16***	0.16*	0.01
NumCustSuperOutcomes	0.17***	0.14	0.35
NumPOtherYJOutcomes	0.10**	0.08	0.23
NumFGCCustSuper	0.20***	0.14*	0.67
NumPriorIntelligence	0.32***	0.17*	2.05*
NumPriorOccurence	0.24***	0.31***	-0.93
NumPriorYouthAid	0.14***	0.22**	-0.99

Table 3.3 : Correlations with re-offending for each risk factor for males and females.

For both sexes, being of Maori or Pacific descent was positively correlated with re-offending and for males, this was significant, $r = 0.12$, $p < 0.01$.

Those cases that were younger at the time of their first CYF intake were more likely to re-offend. This was significant for both sexes, $r = -0.18$, $p < 0.001$ and $r = -0.16$, $p < 0.05$ for males and females respectively.

For both males and females, the frequency of variables related to Care and Protection, such as C&P intakes, social worker findings, and placements were positively correlated with recidivism. These correlations were generally greater for females than males, although these differences did not reach significance.

For both sexes, variables related to Youth Justice such as family group conferences, court appearances and outcomes were positively and significantly correlated to re-offending. These correlations were generally larger for males than females, though, again, the differences failed to reach significance.

Also positively correlated to re-offending were the variables related to history of contact with Police. NumPriorIntelligence was significantly more predictive of re-offending for males than for females ($Z = 2.05$, $p < 0.05$).

The primary question addressed by the present study was whether there was evidence that risk factors for recidivism were different for females than males. To test this, we conducted a series of Cox regressions in which stepwise procedures were used to find the best predictive models for recidivism for both males and females. The criterion for a new risk factor to be included in the model was that it had to add a significant increment in explaining variance at the 0.05 level. Each model represented the subset of variables that best predicted recidivism. The accuracy of each model was then quantified in terms of the area under the receiver operating characteristic (ROC) curve (Rice & Harris, 1995).

Table 3.4 shows the results of the Cox regression for males with the significant variables found to predict re-offending.

Variable	**B**	**Wald**	**df**
MaoriPacific	0.19*	3.91	1
Age1stIntake	-0.12**	8.28	1
NumPCourtDates	0.24***	14.13	1
NumFGCCustSuper	-0.10*	6.01	1
NumPriorIntelligence	0.19***	35.12	1
NumPriorOccurrence	0.08**	10.56	1

Table 3.4: Cox regression results for males with significant variables found to predict re-offending.

Table 3.5 shows the results of the regression for females with the significant variables found to predict re-offending.

Variable	B	Wald	df
NumPriorIntelligence	0.14**	9.50	1
NumPriorOccurrence	0.18**	10.64	1

Table 3.5 : Cox regression results for females with significant variables found to predict re-offending.

For males, being of Maori or Pacific descent was a significant predictor of re-offending. Also, males that were younger at first CYF intake were significantly more likely to re-offend that males that were older.

For both males and females, those that had higher numbers of previous Police intelligence of occurrences were significantly more likely to re-offend.

Once the significant variables for predicting recidivism had been found, Receiver Operating Characteristic (ROC) curves were calculated to assess the predictive validity of the above models for the prediction of re-offending. For males, the area under the ROC curve was 0.72 (see Figure 3.2 below). For females the area under the ROC curve was also 0.72 (see Figure 3.3 below).

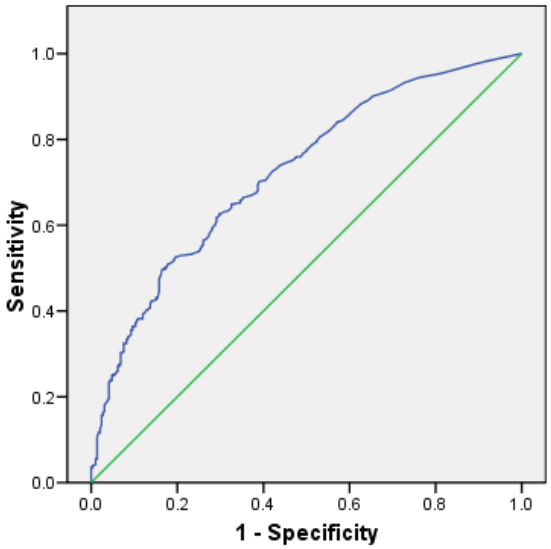

Figure 3.2: ROC curve for male model predicting male data.

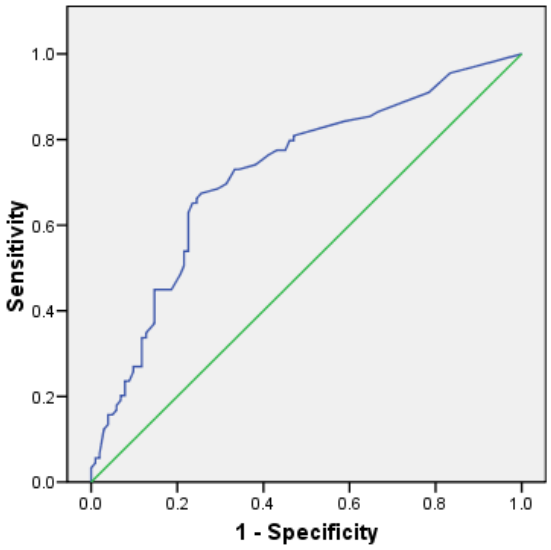

Figure 3.3: ROC curve for female model predicting female data.

The next aim was to test the original question "Can a general model predict both female and male offending, or do separate models have to be developed?" To test this, each model was applied to the other gender's data to ascertain whether a significant

reduction in predictive validity occurred. ROC curves were calculated for each application.

When the male model was applied to the female data, the area under the ROC curve was reduced to 0.70 (see Figure 3.4 below).

When the female model was applied to the male data, the area under the ROC curve was reduced to 0.68 (see Figure 3.5 below).

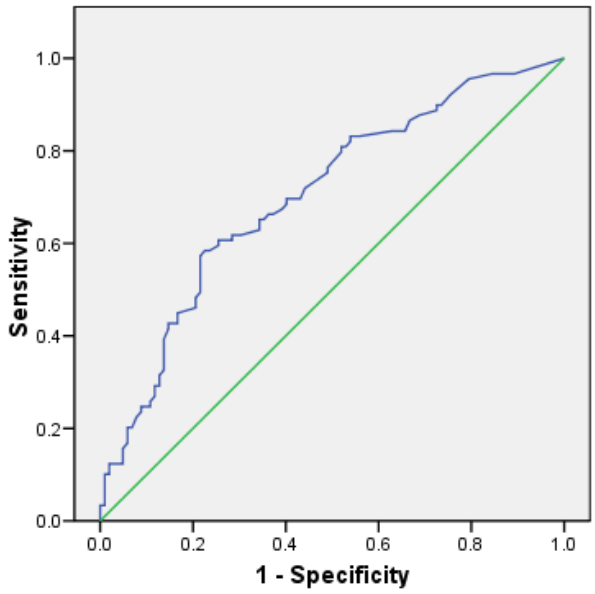

Figure 3.4: ROC curve for male model predicting female data.

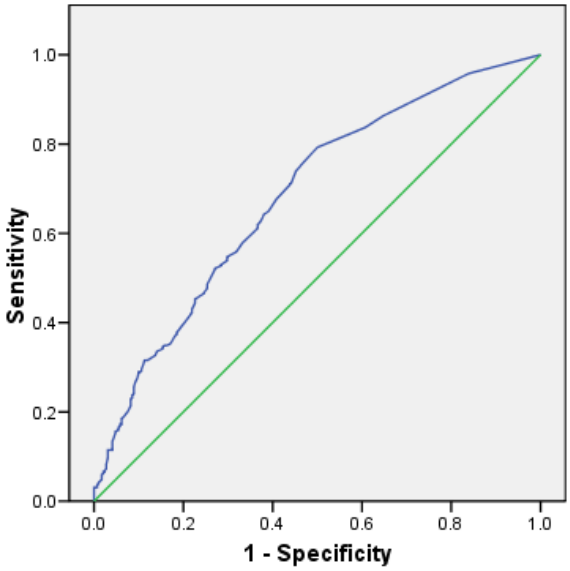

Figure 3.5: ROC curve for female model predicting male data.

A Hanley and McNeil test was performed to see whether these were significant reductions in predictive validity when compared to the original models. Only when the female model was applied to the male data was there a significant reduction in predictive validity ($Z=3.18$, $p < 0.01$).

DISCUSSION

Current Results

The current results show similar findings to previous New Zealand and international research.

Means of Risk Factors

There were some differences and some similarities in the prevalence of each risk factor in each gender.

Males had a significantly higher Number of Prior Intelligence and Occurrence, suggesting that they come into contact with the Police more frequently than females, and already have a higher rate of offending (confirmed by the higher rate of reconviction found in this study). This research is consistent with Funk's (1999) research, where it was found that the frequency of weighted prior offences was a significant factor in predicting male offending.

There was no significant difference between males and females in their number of previous Youth Justice Intakes. This is also consistent with Funk's research. He found that "placement in detention" was the only significant predictor of offending in both the male-only and female-only models.

In Funk's model, child abuse and runaways were unique factors in the female-only model of offending. However, this was not reflected in the current study's results. There was no significant difference in the occurrence of Physical or Emotional Abuse between males and females, although females had a significantly higher rate of Neglect. This is also not consistent with Acoca's (1998) research, which found that

female delinquents have a higher incidence of abuse in their histories than do male delinquents.

Females in this study also had a higher rate of self-harm. This is in line with Chandy et al.'s (1996) research, that depression and anxiety are more pronounced in females that have been exposed to traumatic events – which self-harm is often the result of.

Risk Factors Predictive of Reconviction

Age at First Youth Justice Intake was significantly correlated with re-offending for males but not for females in this study. This is consistent with Funk's research that also found that "age at focus offence" was a significant factor in predicting male offending (but not female offending).

The Number of Prior Intakes was also consistent with Funk's research, finding that this was predictive for both females and males. As noted in the previous section, this was the only common significant predictor in both male and female models of offending in Funk's study.

All Court Outcomes were highly predictive of male re-offending in this study, whereas only a couple of the outcomes (custody) were predictive of female re-offending, and weakly correlated in comparison to males. This also fits with Funk's findings that the frequency of weighted prior offences was a significant predictor of offending in males.

Risk Prediction Models for Males and Females

The significant variables found to predict re-offending for males were : Ethnicity (being of Maori or Pacific descent), Age At First Intake, Number of Prior Court Dates, Number of FGCs that resulted in Custody or Supervision, Number of Prior Intelligence and Number of Prior Occurrence.

The younger the males were at First Intake the more likely they were to re-offend. This is consistent with research that has found that earlier antisocial behaviour is a risk factor for future chronic recidivism. Those that begin their antisocial behaviour in adolescence are less likely to continue to re-offend. This is further confirmed by the other risk factors, suggesting that the males that re-offended in this study already had a history of re-offending.

The significant variables found to predict re-offending for females were : Number of Prior Occurrence and Number of Prior Intelligence.

Both males and female had prior contact with police and youth justice as predictive of future re-offending. This is consistent with Maxwell and Robertson's (1995) report, who found that 37% of the young people in their study were already known to the police and 15% had prior Youth Justice FGCs.

Future Research

The next stage in the research would be to develop a New Zealand screening tool for identifying risk factors in youth. Similar screening tools have been developed overseas for programmes such as the 8% Early Intervention Programme in Orange

County, California. This screening tool looks at many different factors that are proven to predict re-offending in youth.

This youth risk screening tool would function similar to the current 'Risk of Conviction, Risk of Imprisonment' (or 'RoC*RoI') system in place for adults in New Zealand. This screening tool measures not only how likely an offender is to re-offend, but how likely they are to be imprisoned for such an offence. The higher the number, the higher the likelihood of them seriously re-offending. In developing a screening tool such as this for New Zealand youth, we would be able to better identify and treat those youth who are at high risk of re-offending.

A more complex overview and screening process of young offenders will need to be developed to increase the predictive validity of the existing models from this current research. Factors such as conduct disorders diagnosed, socio-economic status, family structure etc will need to be included in the analysis. These and other risk factors have been identified as strong predictors of recidivism in international research, and would be important to include to get a fuller picture of risk prediction in New Zealand.

If screening tools like this are completed on first contact with Child, Youth and Family and added to every intake, it would build up a complete picture of the young person and their rehabilitative needs.

Identifying and treating those that are at highest risk is the most cost-effective way of reducing crime (and money spent on it). International research shows that only 4-6% of offenders commit around 50% of crime. If those 4-6% can be identified and treated, crime rates would reduce significantly.

The next step in the research would be to develop a better structure for identifying and addressing youth offender needs. The current FGC system would work much more efficiently if the community or Child, Youth and Family had a better range of empirically-tested programmes to offer to high-risk youth. An Intervention Service similar to Department of Correction's Rehabilitation Sector and Programme Delivery would be highly useful for providing young people with rehabilitative programmes, before they become adult offenders.

In light of this, once the New Zealand youth risk predictors are identified, more rehabilitative programmes will need to be developed to accurately identify, assess and treat young offenders according to their rehabilitative needs.

Summary

In summary, the results of the current research show similar findings to previous international research on the risk factors for recidivism in youth offenders. Although there are some differences, the risk factors for males and females appear to be similar.

Future research would need to be focused in development of a screening tool for risk factors in youth, as well as providing empirically-tested rehabilitation programmes.

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